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## (54) A HUB TRANSMISSION

(71) We, HURTH VERWALTUNGS—  
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 Munchen 40, Germany, a German Com-  
 pany, do hereby declare the invention, for  
 5 which we pray that a patent may be granted to  
 us, and the method by which it is to be  
 performed, to be particularly described in  
 and by the following statement:—

The invention relates to a hub trans-  
 mission especially for electrically driven  
 trucks, e.g. fork lift trucks.

Hub transmissions are known in which  
 shoe brakes are provided in the hub or in  
 the transmission casing. This arrangement  
 15 is bulky, and in addition shoe brakes, with  
 their bearing system and actuating means,  
 are complicated and expensive.

In known electrically driven hubs the  
 shaft of the electric motor mounted on the  
 hub may be extended on the side remote  
 20 from the hub, so that the shaft projects  
 from the motor casing. The brake is  
 mounted on this shaft stub. This arrange-  
 ment lengthens the pivoting radius of the  
 hub, so that the vehicle requires more space  
 and, for example, the gangways between  
 racks in warehouses must be widened. Thus  
 the warehouse capacity depends to some  
 extent on the pivoting radius of the hub.

30 An object of the invention is to reduce  
 the pivoting radius of the hub and with it  
 the space required by the vehicle, for ex-  
 ample a lift truck.

This invention resides in a hub trans-  
 35 mission, including a star gearing in the  
 hub, and a plate-type brake provided in the  
 hub or a casing of the star gearing. A  
 particularly compact construction is if the  
 brake is mounted coaxially with the sun  
 40 or central gear of the star gearing, at least  
 one inner brake plate is coupled to the  
 central gear or a shaft fast therewith, and  
 at least one outer brake plate is connected  
 to a stationary member to prevent rotation  
 45 but permit axial motion of this brake plate.

The invention will now be further des-  
 cribed with reference to the accompanying  
 diagrammatic drawing.

On a hub 1 a tyre 2 is fixed in a known  
 manner. To steer the vehicle, the wheel 50  
 can be pivoted about an axis 3 running  
 approximately through the centre of the  
 tyre. The pivoting motion is produced by a  
 flange 4 or the like, which is pivotably  
 mounted on the chassis (not shown) and can  
 55 be driven to effect steering. The electric  
 motor 5 to drive the wheel is screwed to the  
 flange. The shaft 6 of the electric motor  
 projects through the flange 4 and bears  
 teeth 7 on its outer end. These teeth form  
 60 a sun gear or central gear and mesh with  
 one idler gear 8 of a star gear train whose  
 second gear 9 meshes with the teeth of a  
 gear 10. The latter teeth engage a ring gear  
 11, which either forms part of a casing 12  
 65 for the transmission or is fixed inside such  
 a casing. The casing 12 and hub 1 are  
 attached to one another with screws. Stud  
 13, 14 fixed to the flange 4 form bearings  
 for the gears 8, 9, 10. Some of the studs 13  
 70 extend beyond the gears 8, 9 and are  
 engaged by outer plates 15 of a multi-plate  
 brake. The peripheries of the outer plates  
 contain recesses conforming to and fitting  
 onto the studs. The outer plates are coaxial  
 75 with the central gear. Inner brake plates 16  
 are toothed to engage the teeth 7 on the  
 shaft 6, and cooperate with the outer plates  
 in well-known manner. A thrust member 17  
 in front of the outermost outer plate 15  
 80 has a central pin 18, mounted in the hub 1  
 and projecting outwards from it; separate  
 bearings and sealing means (not shown)  
 may be provided for the purpose of mount-  
 ing if necessary. One arm 19 of a bell crank  
 85 20 pivotably mounted on the flange 4 bears  
 on the pin 18. The other arm 21 of the  
 bell crank is actuated from the chassis by  
 way of actuating means, without interfer-  
 ing with pivoting of the flange 4: to this 90

end the actuating means engages in a bore 22 formed in the second arm 21 on the pivoting axis 3.

- 5 Traction on the actuating means causes the bell crank to pivot anticlockwise (in the drawing). Its arm 19 then presses on the pin 18 and therefore on the thrust member 17, which urges the inner and outer plates against one another so that the rotating shaft 6 and the rotating wheel 1, 2 are 10 braked relative to the non-rotating flange 4 by means of the studs 13.

15 Since the braking system is substantially closer to the pivoting axis 3 than is the endshield 23 of the electric motor, the pivoting radius of the wheel is not increased by the braking system, in spite of its co-axial disposition.

WHAT WE CLAIM IS:—

- 20 1. A hub transmission, including star gearing in the hub, and a plate-type brake provided in the hub or a casing of the star gearing.  
 2. A transmission as claimed in Claim 25 1 in which the brake is a multi-plate brake.  
 3. A transmission as claimed in Claim 1 or 2, in which the brake is mounted co-axially in the hub relative to the inner

central gear of the star gearing, at least one inner brake plate engages the central gear 30 or a shaft connected thereto, and at least one outer brake plate is connected to at least one stationary member in such a way as to be fixed in respect of rotation but movable longitudinally. 35

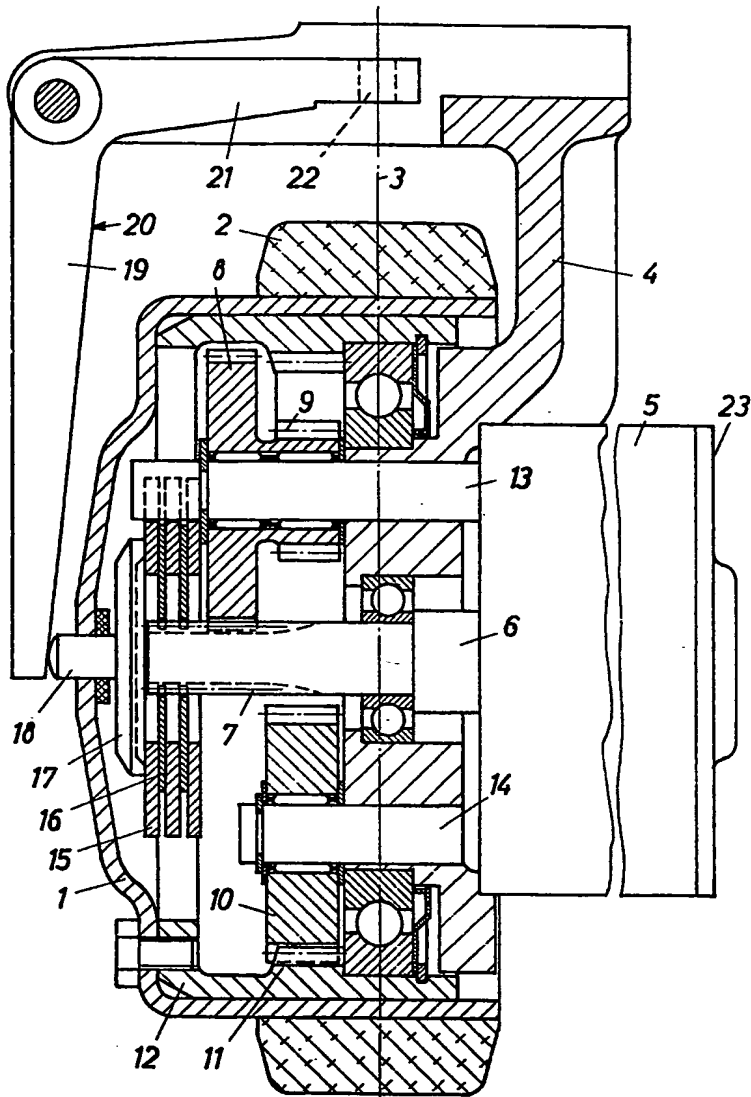
4. A transmission as claimed in Claim 3 in which the stationary member is a stud fixed to a hub-carrying flange.

5. A transmission as claimed in Claim 4 in which the or each stud is a journal 40 carrying at least one idler gear of the transmission.

6. A transmission as claimed in any of the preceding Claims, in which the brake can be operated by means of a thrust mem- 45 ber or the like by way of an outwardly projecting member mounted on the rotational axis of the casing or hub.

7. A hub transmission substantially as herein described with reference to the ac- 50 companying drawing.

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